Global Burden of Crop Loss

Global Burden of Crop Loss:

Data and evidence for global food security

KNOWLEDGE FOR LIFE

CABI

The growing challenge of crop loss

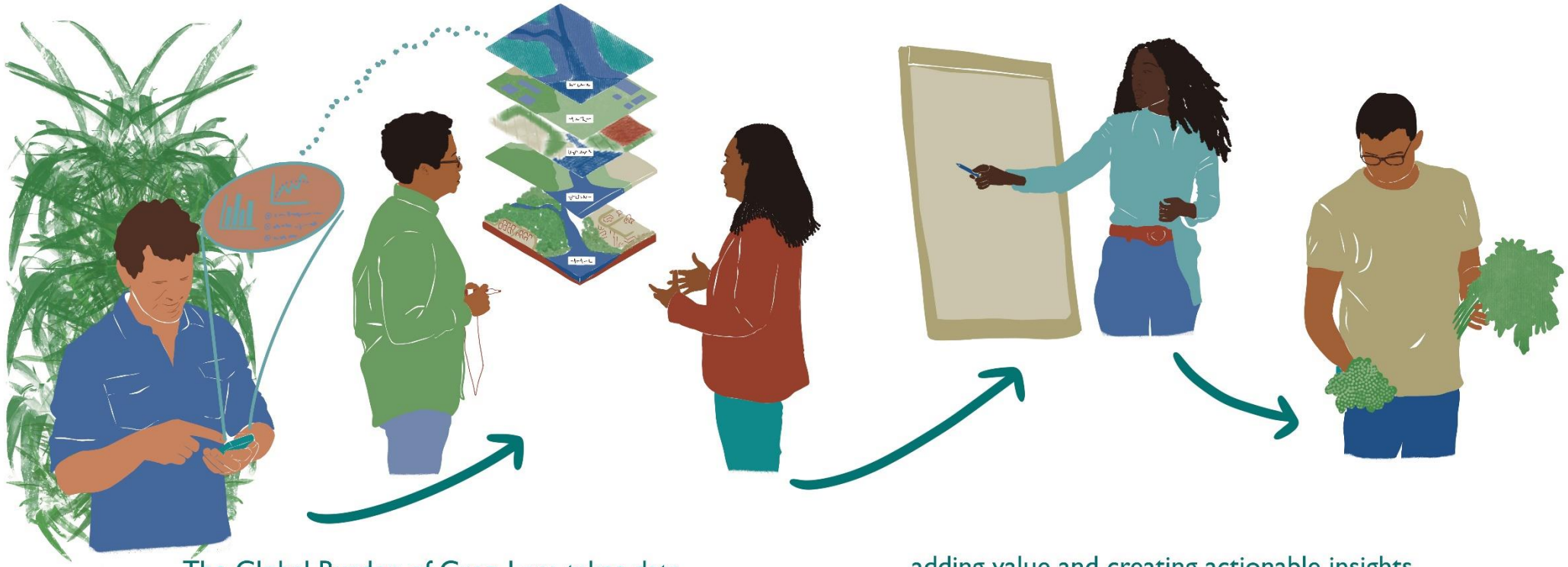
Keeping pace with the growing demand for food, under increasing impacts from climate change, is one of the defining challenges of our time.

High levels of crop loss makes this even harder. Around **40%** of the world's crops are lost to pests alone.

Decision makers lack the evidence they need to help them understand and tackle this problem.

We will generate the evidence that's needed to take effective action against crop loss.

How it works...



The Global Burden of Crop Loss takes data from around the worlds and transforms it…

adding value and creating actionable insights for governments, funders and researchers.

Theory of Change

Impacts

Improved food security and resilience for farmers globally

Long-term outcomes

Data-driven resource allocation
National and regional strategies aim to reduce losses
Funding directed towards filling knowledge gaps

Intermediate outcomes

Stakeholders aware of where and why losses are happening and the magnitude of losses

Outputs

Global crop specific burden estimates produced broken down by: yield loss, causes/attribution, economic burden (revenue, cost of control)

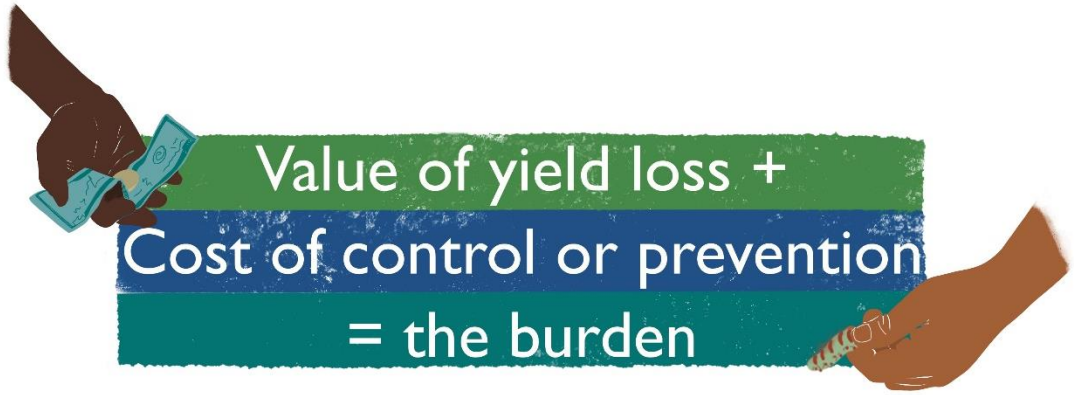
Inputs

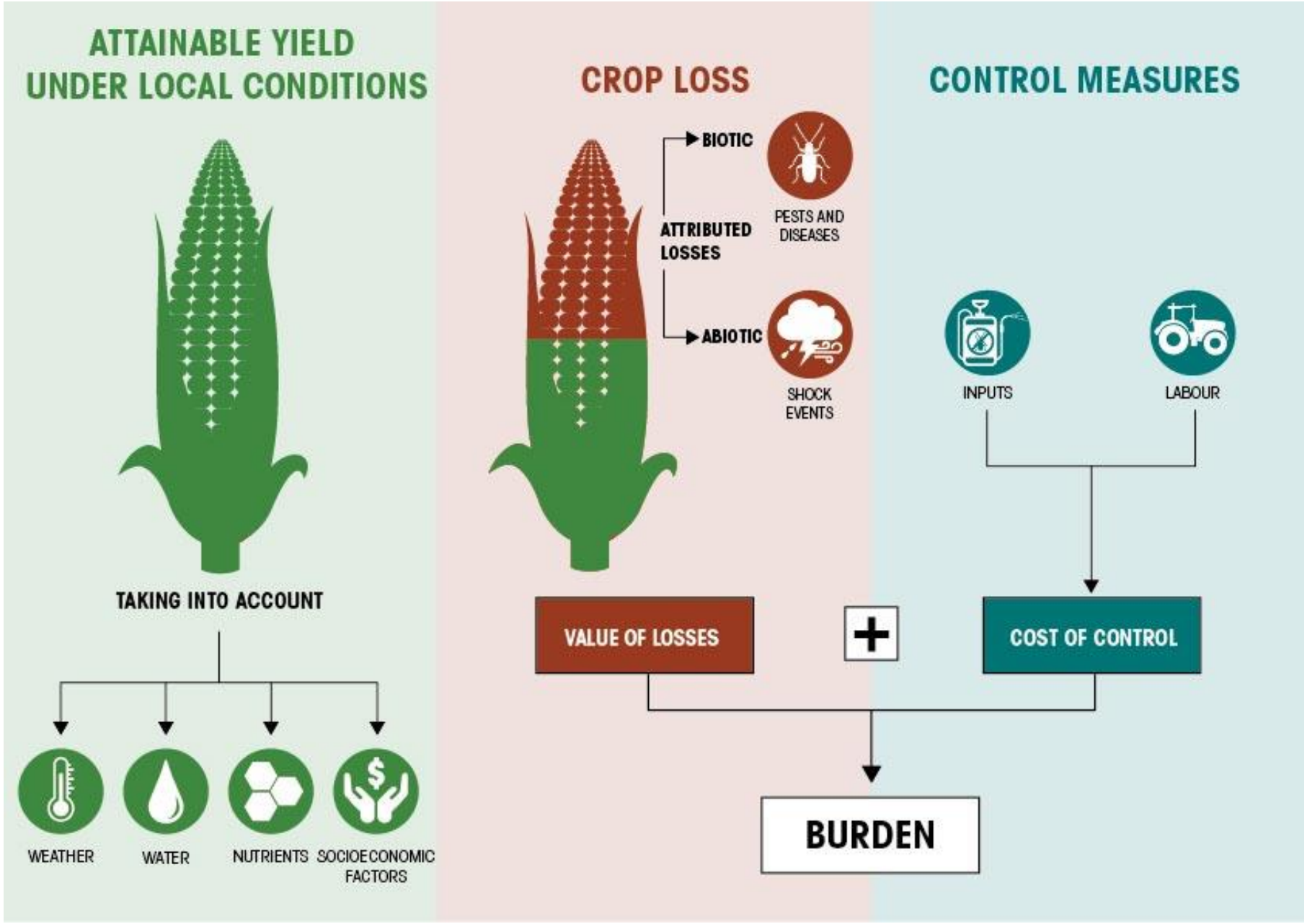
Datasets
Methods, skills and expertise
Collaboration

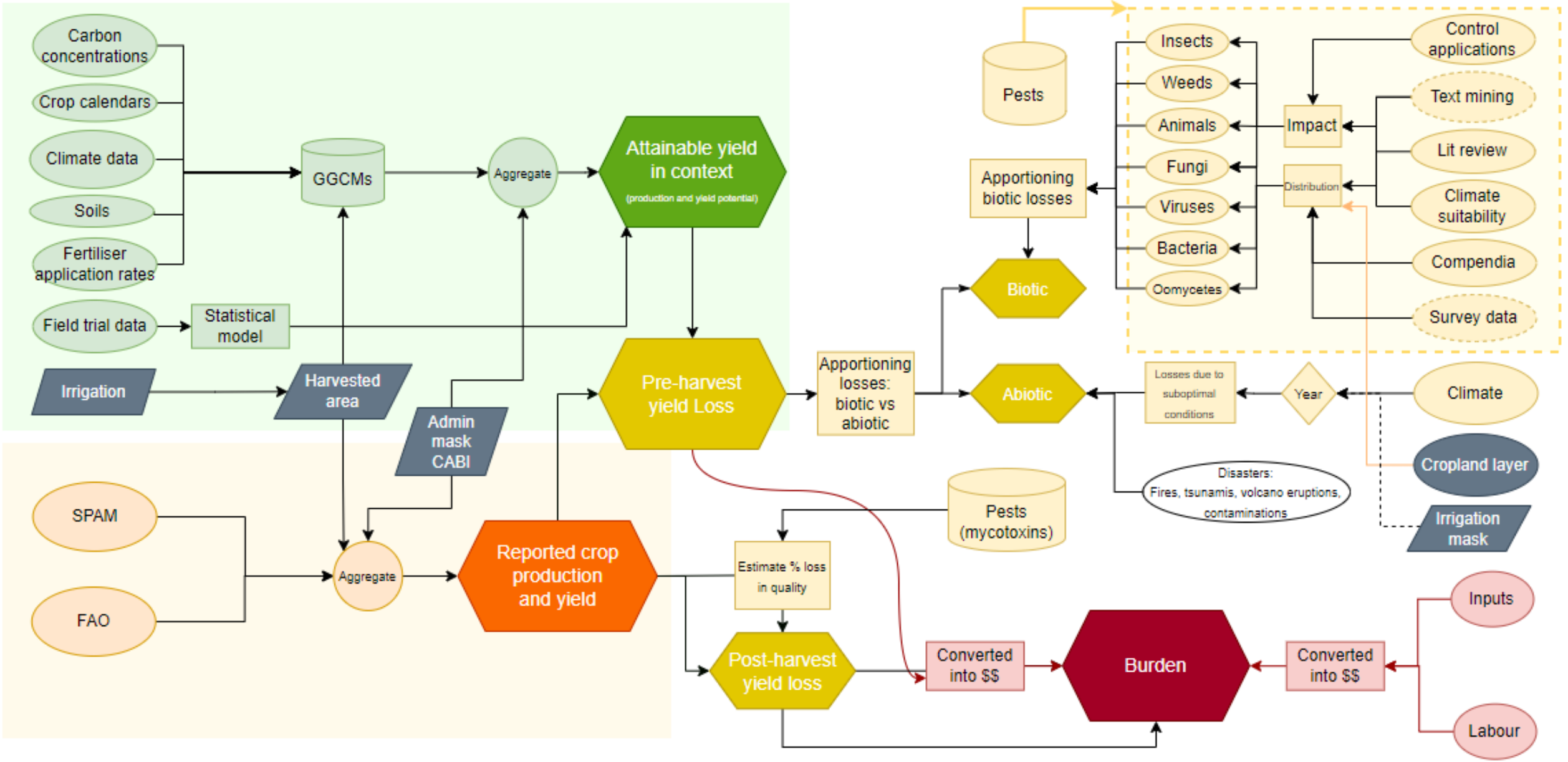
The burden of crop loss

- We define the **burden** caused by crop loss as the value of the crops that were lost, plus the cost of control measures employed

- The burden is simple, clear, metric comparable across crops, production systems, and time

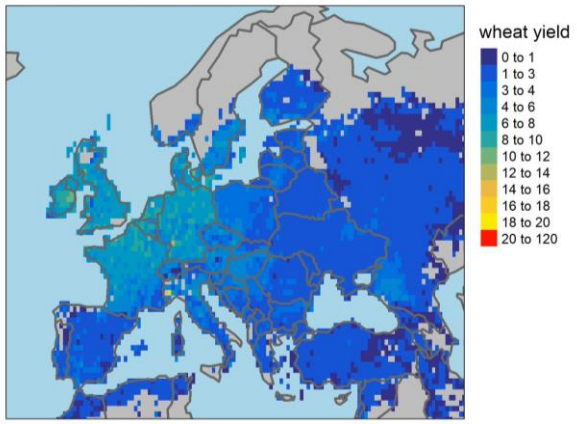



ATTAINABLE YIELD
UNDER LOCAL CONDITIONS
TAKING INTO ACCOUNT
WEATHER
WATER
NUTRIENTS
SOCIOECONOMIC FACTORS
CROP LOSS
BIOTIC
ATTRIBUTED LOSSES
ABIOTIC
PESTS AND DISEASES
SHOCK EVENTS
CONTROL MEASURES
INPUTS
LABOUR
VALUE OF LOSSES
+
COST OF CONTROL
BURDEN

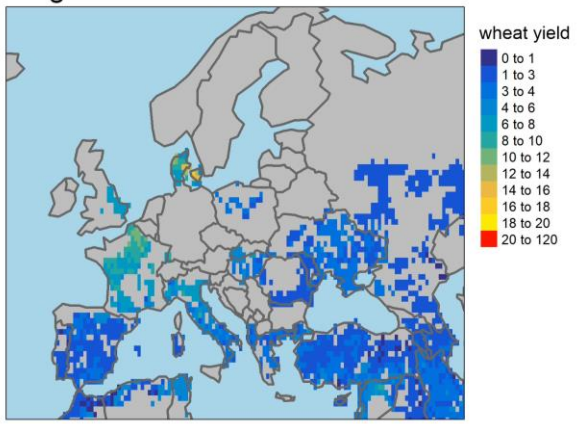

Carbon concentrations
Crop calendars
Climate data
Soils
Fertiliser application rates
Field trial data
Statistical model
Irrigation
Harvested area
GGCMs
Aggregate
Attainable yield in context
(production and yield potential)
Admin mask CABI
Pre-harvest yield Loss
Pests
Insects
Weeds
Animals
Fungi
Viruses
Bacteria
Oomycetes
Apportioning biotic losses
Biotic
Impact
Distribution
Control applications
Text mining
Lit review
Climate suitability
Compendia
Survey data
Apportioning losses: biotic vs abiotic
Abiotic
Losses due to suboptimal conditions
Year
Climate
Cropland layer
Irrigation mask
Disasters: Fires, tsunamis, volcano eruptions, contaminations
SPAM
FAO
Aggregate
Reported crop production and yield
Pests (mycotoxins)
Estimate % loss in quality
Post-harvest yield loss
Converted into $$
Burden
Converted into $$
Inputs
Labour

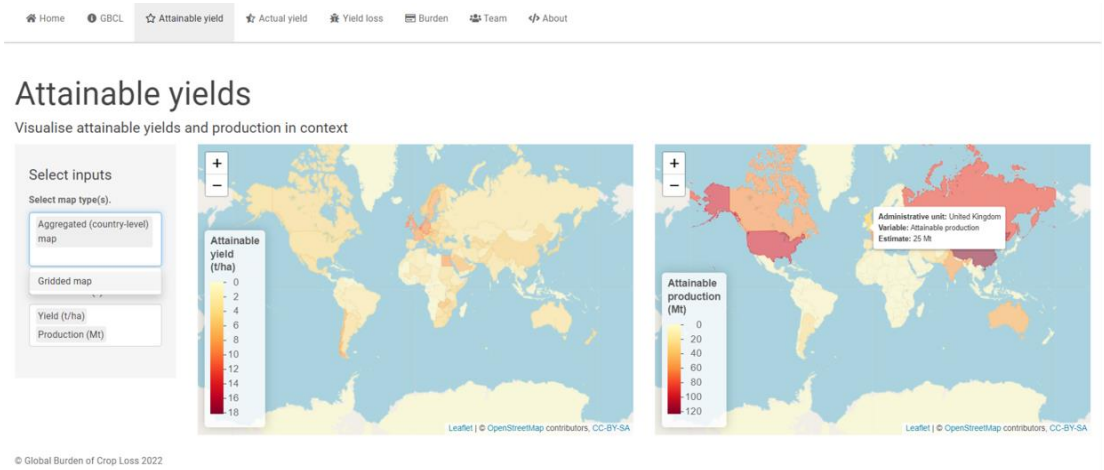
Loss estimates in dynamic dashboard

Rainfed scenario: 1902



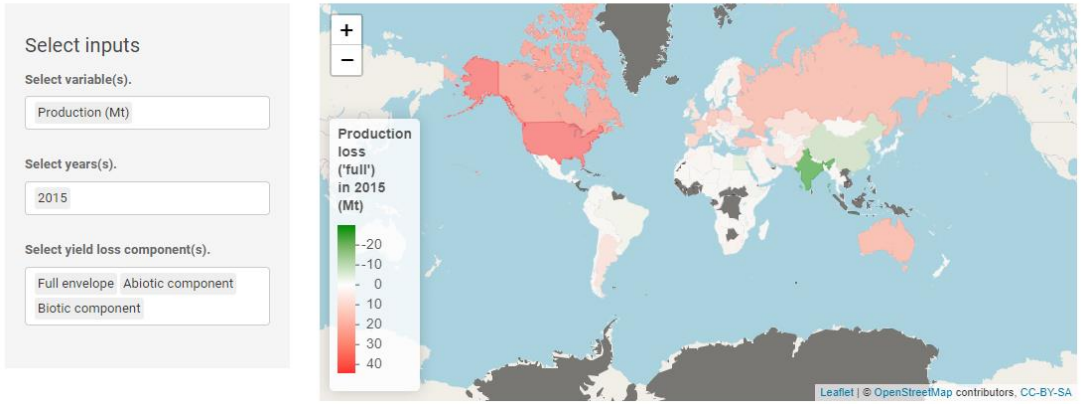
Irrigated scenario: 1902





Yield loss

Visualise yield and production losses

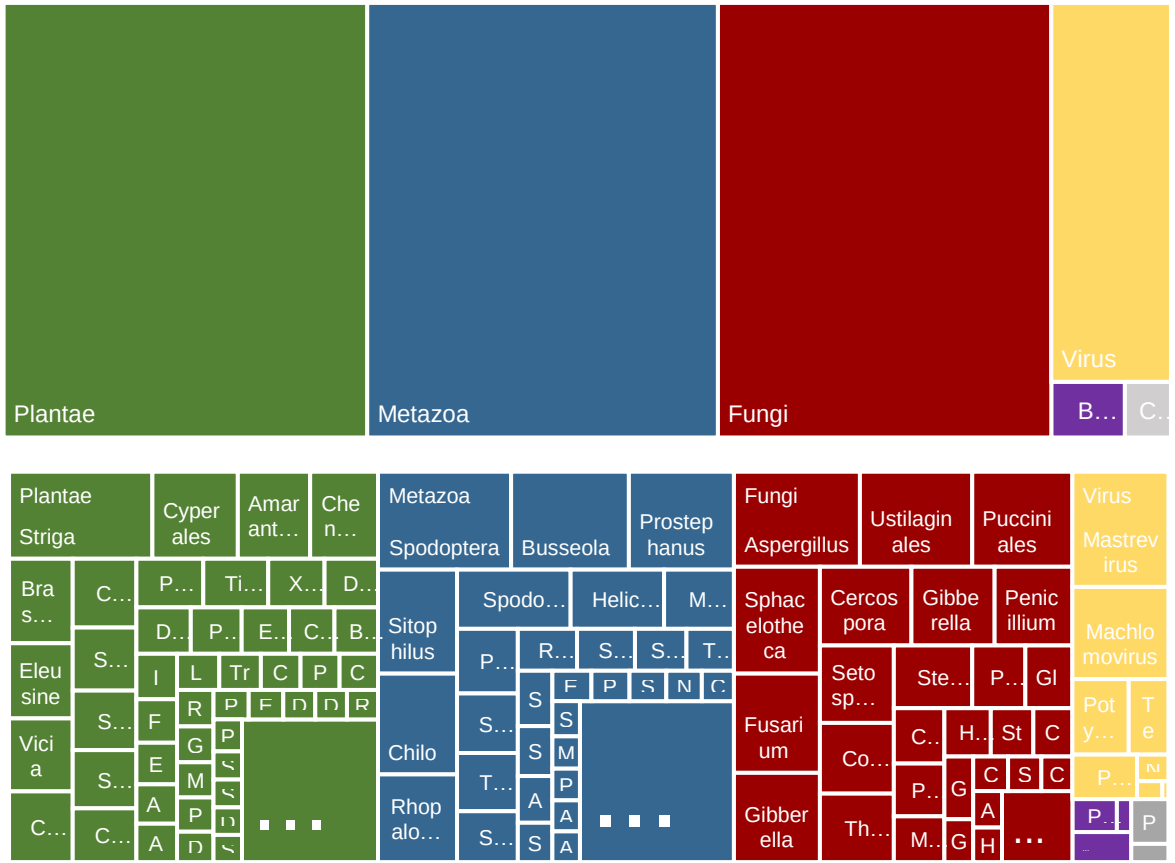


Estimates of maize yield losses in Kenya and key biotic constraints

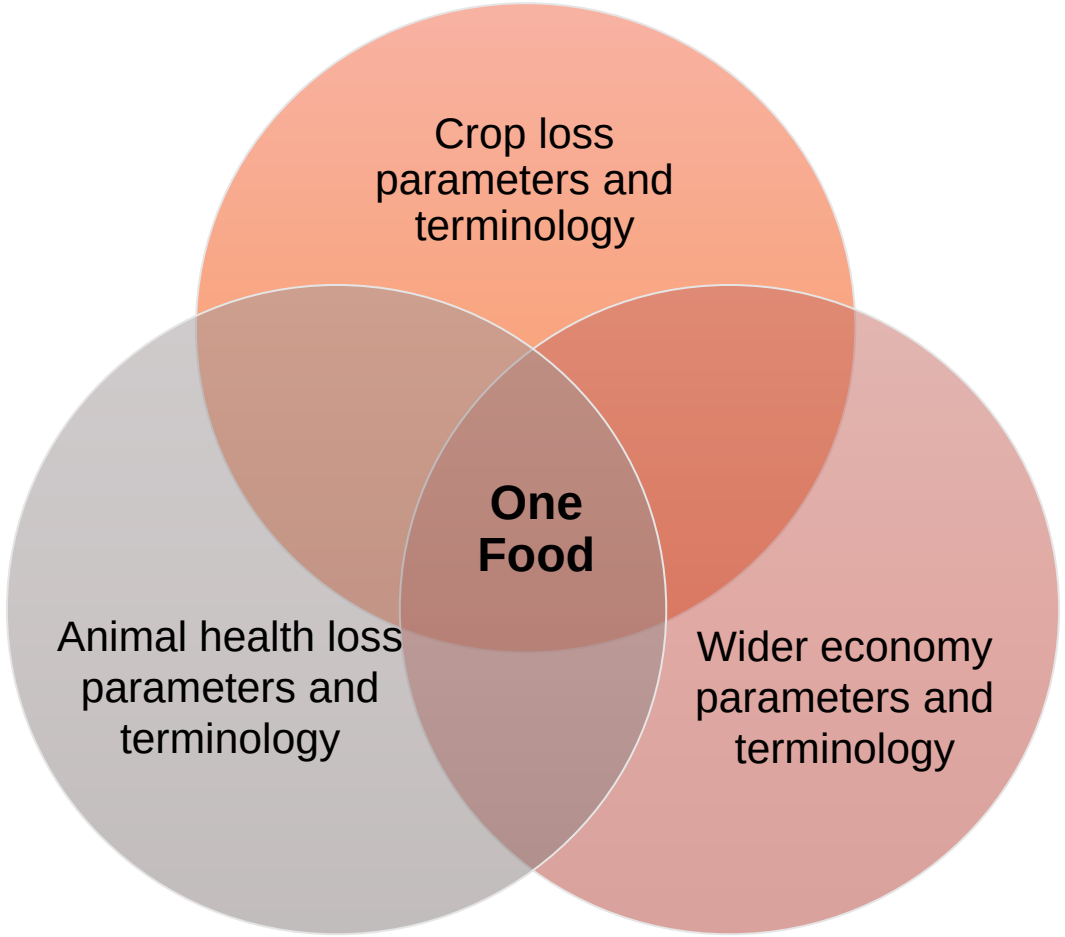
Attainable yield and loss estimates

Attainable production 2010 2015	4,230,077 t 4,419,416 t
Actual production FAO 2010 2015	3,464,598 t 3,825,092 t
Total loss envelope 2010 2015	765,479 t 594,324 t

Key biotic factors – by group and genus



GBADs + GBCL collaboration in One Food project



One Health as a framework for food system transformation

Collaborating on the economic hub of the South-Africa based One Food project

Global Burden of Crop Loss

GBADs

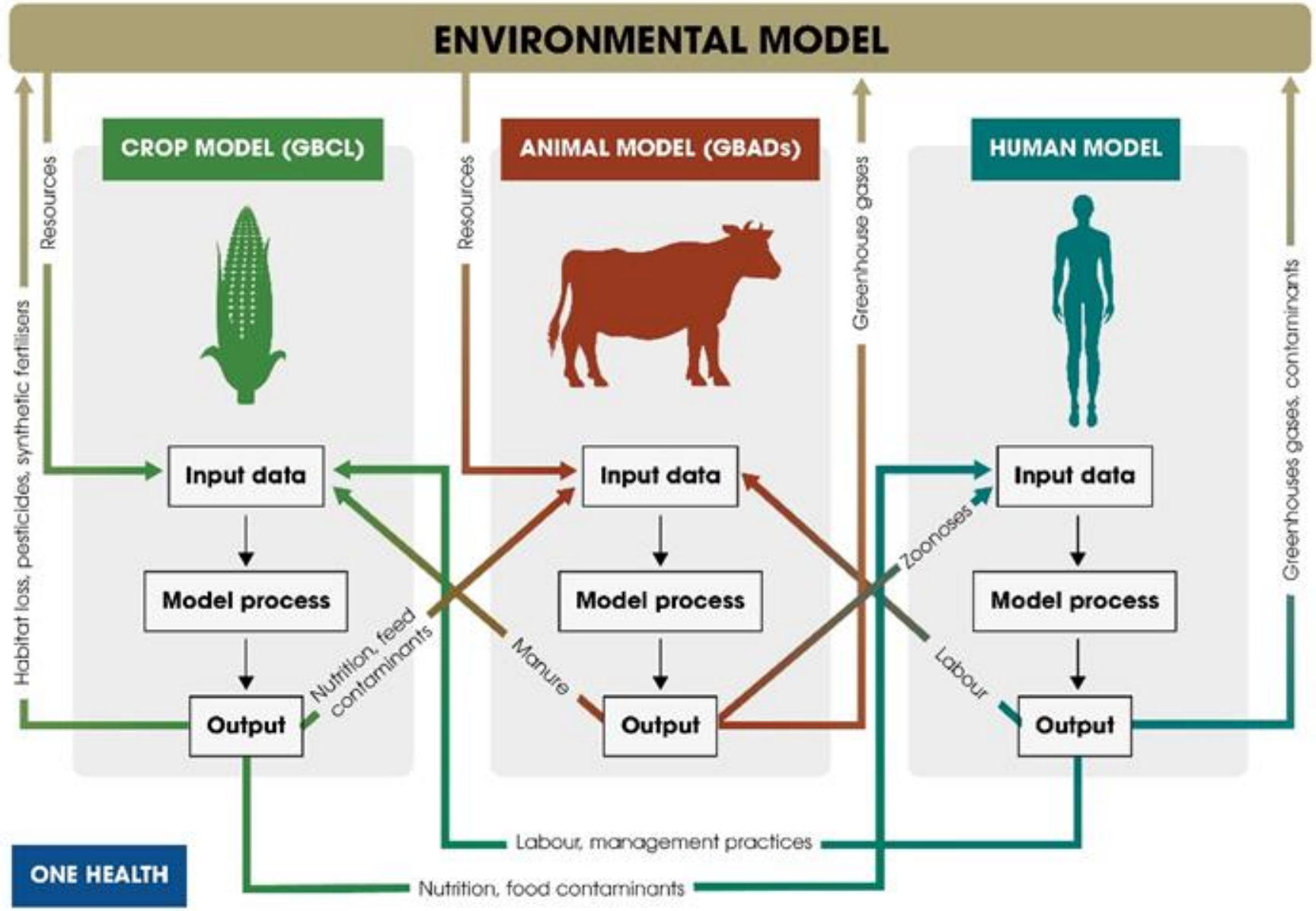
One Health

ONE FOOD

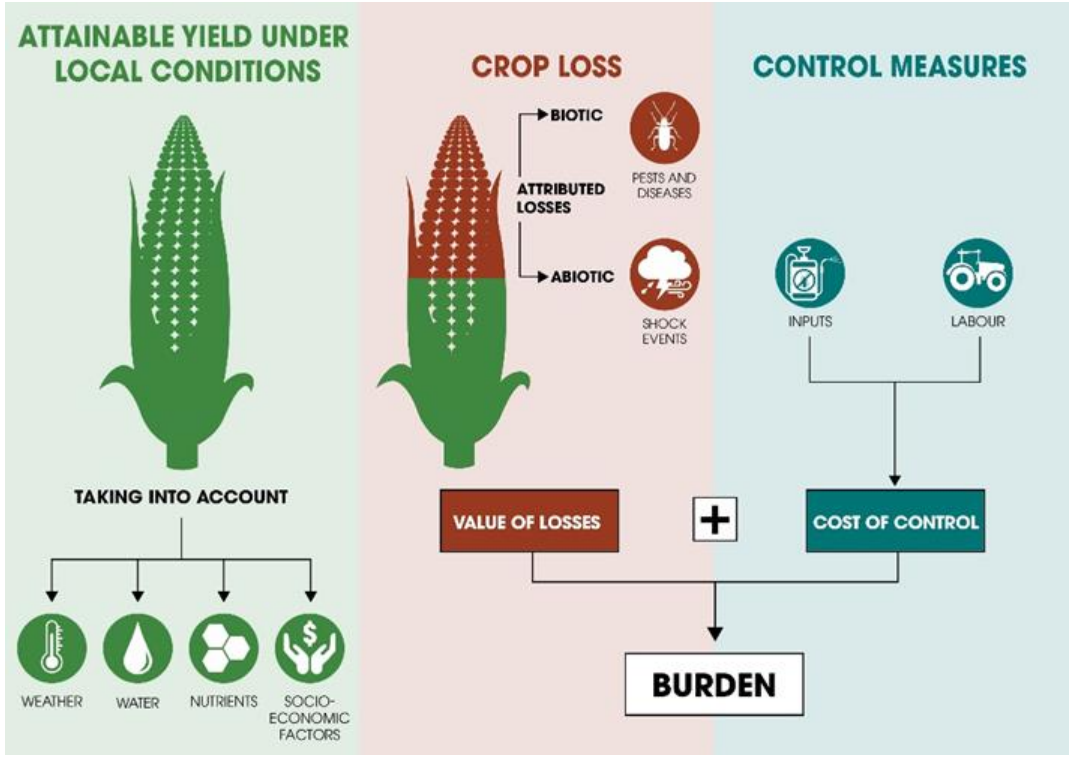
GBADs

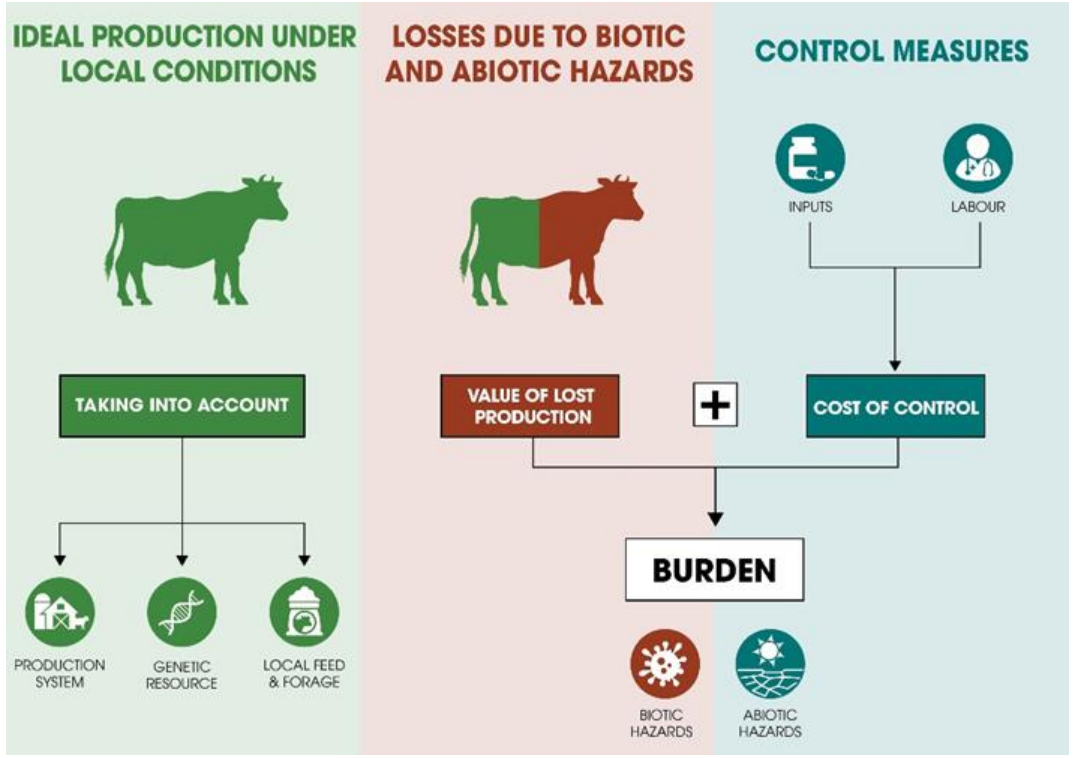
UNIVERSITY OF LIVERPOOL

Cefas

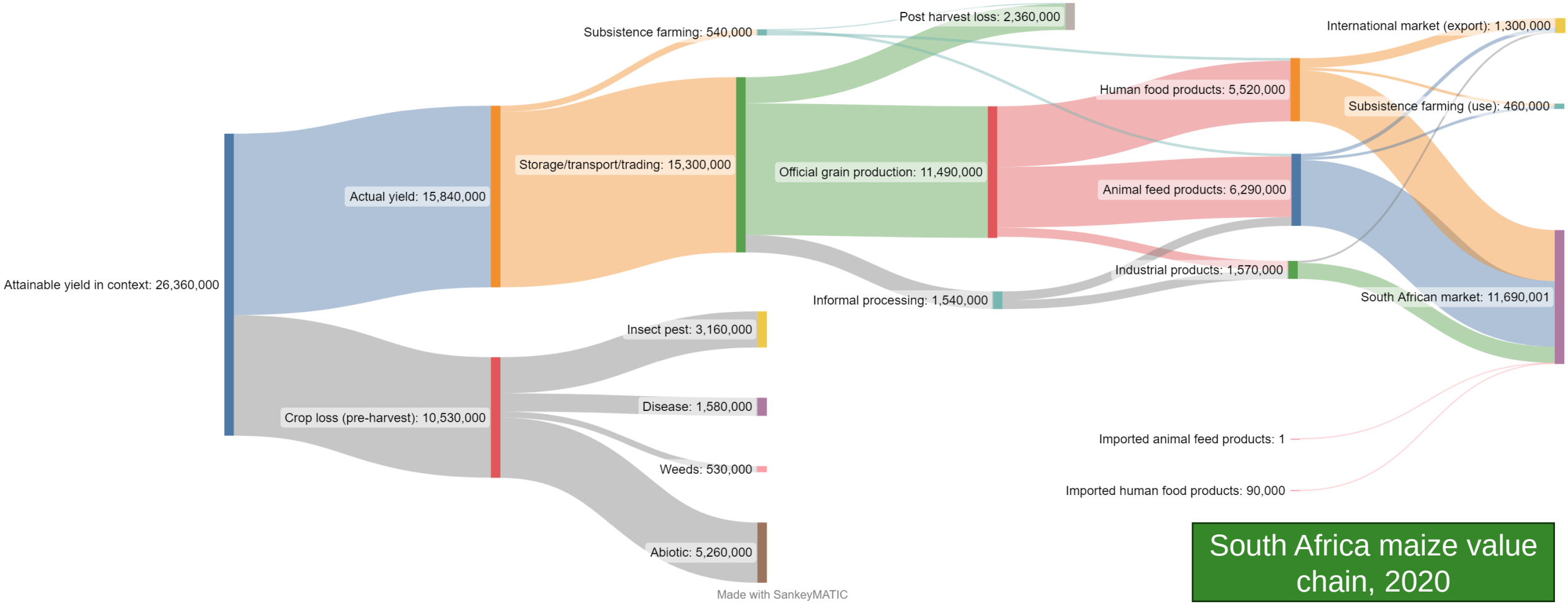


Linking GBADs and GBCL: Crop Loss and Animal Health Loss Envelopes and Burdens

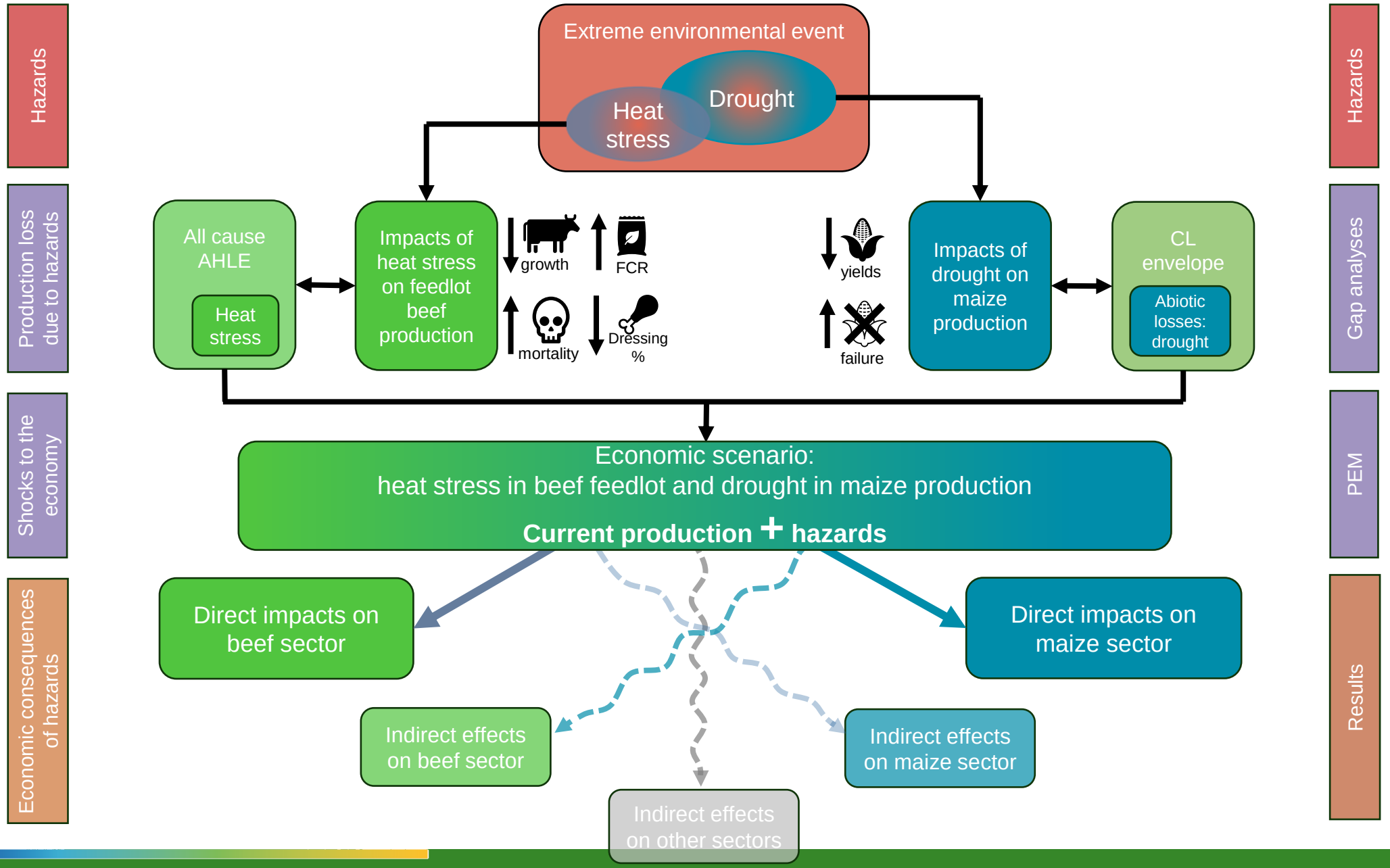


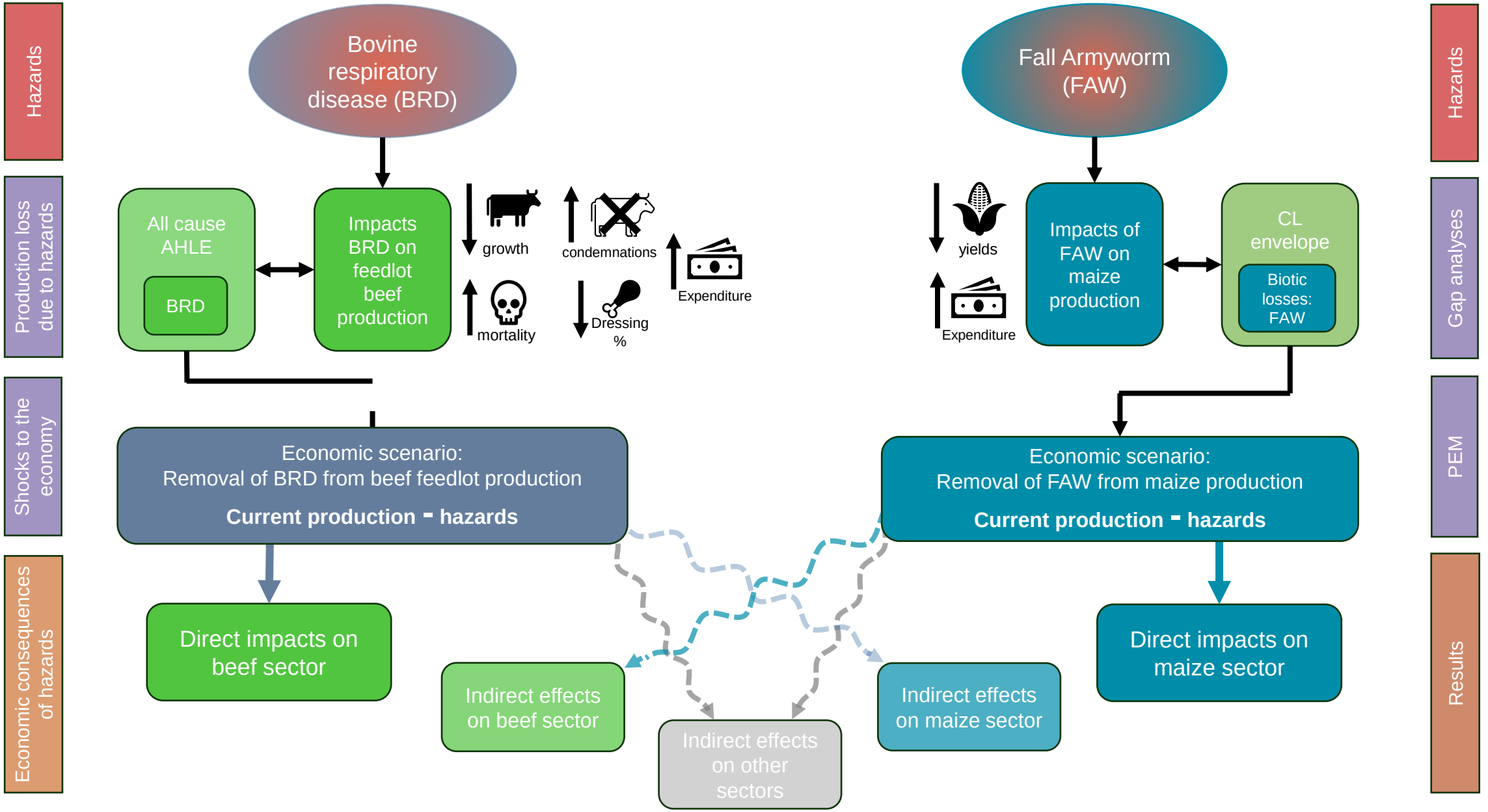


Linking GBADs and GBCL: Mapping out linkages between sectors



South Africa maize value chain, 2020


Hazards
Production loss due to hazards
Shocks to the economy
Economic consequences of hazards
Extreme environmental event
Heat stress
Drought
All cause AHLE
Heat stress
Impacts of heat stress on feedlot beef production
growth
FCR
mortality
Dressing %
yields
failure
Impacts of drought on maize production
CL envelope
Abiotic losses: drought
Economic scenario:
heat stress in beef feedlot and drought in maize production
Current production + hazards
Direct impacts on beef sector
Direct impacts on maize sector
Indirect effects on beef sector
Indirect effects on maize sector
Indirect effects on other sectors
Hazards
Gap analyses
PEM
Results


Hazards
Production loss due to hazards
Shocks to the economy
Economic consequences of hazards
Bovine respiratory disease (BRD)
All cause AHLE
BRD
Impacts BRD on feedlot beef production
growth
condemnations
Expenditure
mortality
Dressing %
Economic scenario:
Removal of BRD from beef feedlot production
Current production - hazards
Direct impacts on beef sector
Fall Armyworm (FAW)
yields
Expenditure
Impacts of FAW on maize production
CL envelope
Biotic losses: FAW
Economic scenario:
Removal of FAW from maize production
Current production - hazards
Direct impacts on maize sector
Indirect effects on beef sector
Indirect effects on other sectors
Indirect effects on maize sector
Hazards
Gap analyses
PEM
Results

GBCL Plans 2025-2027

Global coverage

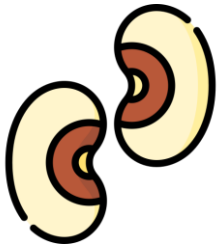
Wheat

Maize

Rice

Regional – tropical crops

Cassava



Cowpea

Banana

Deliverables

- Attainable yield estimates (suite of statistical and mechanistic approaches)
- Crop loss envelope estimates
- High level attribution of crop loss to abiotic/biotic factors
- Economic burden estimates
- Gendered burden of crop loss

Case study countries

Kenya
Ghana

Ethiopia

India

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Australian Government Australian Centre for International Agricultural Research

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Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Swiss Agency for Development and Cooperation SDC

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The Alan Turing Institute AI UK

Bill & Melinda Gates foundation

AgMIP

UKaid from the British people

CABI

abacusbio.

University of Exeter

Rothamsted Research

GBADs

International Plant Protection Convention

Assimila

CIMMYT International Maize and Wheat Improvement Center

Cervantes agritech forewarned is forearmed